

## Atrial septum around the fossa ovalis: An ideal patch for the ventricular septal defect

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In general, ventricular septal defects (VSDs) are closed with a prosthetic patch or a patch of pretreated heterogeneous pericardium. Instead of the conventional materials for closing a VSD, we adopted a patch of autologous atrial septum taken from around the fossa ovalis as a one-off procedure. We report our experience of VSD closure using a cost-saving, ideal patch.

### Clinical Summary

A male infant weighing 5100 g was referred to our hospital with respiratory distress. According to 2-dimensional echocardiography, the atrial septum was intact, but a large perimembranous VSD extended to the trabecular portion. From cardiac catheterization data, the systolic pulmonary arterial pressure was equal to the systolic systemic pressure, the left-to-right shunt ratio was 58% and the right-to-left shunt ratio was 21%, and the pulmonary arterial resistance was 7.4 Wood units.

Surgical repair was performed at 9 months of age. Through a median sternotomy, moderate hypothermic cardiopulmonary bypass was instituted in the usual manner. After arrest of the heart, the right atrium was incised longitudinally. The atrial septum was intact and the persistent foramen ovale was not detected. The elliptic fossa ovalis had a major axis of 20 mm and a minor axis of 15 mm. The atrial septum was excised along the limb of the fossa ovalis, with a 2-mm wide remnant of the septum left for suture closure of the gaping hole. The resected atrial septum was 15 mm in diameter and 1.2 mm thick (Figure 1). The thin muscular layer was identified between both layers of the endocardium. The peri-

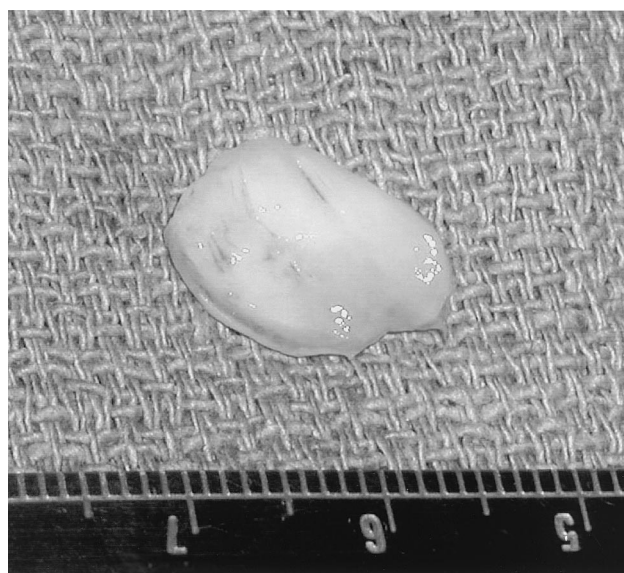


Figure 1. The atrial septal patch.

membranous trabecular VSD was 15 mm in diameter. Through the right atrium, fourteen 5-0 polypropylene sutures with pledgets were placed around the VSD as mattress stitches. The interrupted sutures were passed through all the layers of the atrial septal patch and then tied (Figure 2). The VSD was completely filled with the atrial septal patch. The gaping hole in the atrial septum was closed directly with a running 5-0 polypropylene suture. Postoperative 2-dimensional echocardiography showed no residual shunts through the atrial septum or the ventricular septum.

### Discussion

The standard operation for VSDs is patch closure with prosthetic material or pretreated heterogeneous pericardium.<sup>1</sup> However, the conventional materials for patching VSDs are very expensive and do not have impeccable compatibility or resistance to bacterial infection. Furthermore, some prosthetic materials can cause hemolysis.<sup>2</sup> These problems may be avoided only by using an autologous material. Although autologous pericardium is readily used for treating pulmonary arterial deficits or intra-atrial deficits, it is not

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**Figure 2. Intraoperative findings. Black arrow, Atrial septal patch. White arrow, Atrial septal gap after resection of the septal patch.**

suitable as a VSD patch because of its thinness.<sup>3</sup> Therefore, the risk of ventricular septal aneurysmal formation cannot be avoided.<sup>4</sup>

A more promising material is a patch of autologous atrial septum taken from around the fossa ovalis. To our knowledge, its use for VSD closure has not been reported. The material has several advantages. It has an adequate thickness and has a thin

muscular middle layer between 2 endocardial layers. It does not lack strength, adaptation, or biocompatibility. Furthermore, in case of infective endocarditis, it is the most desirable material. The atrial septal patch can also be harvested at reoperation. Because the atrial septum around the fossa ovalis does not contain the intra-atrial conduction pathway,<sup>5</sup> resection of the atrial septum does not involve a considerable risk of postoperative supraventricular arrhythmia. The atrial septum is somewhat stretchable, so that relatively large VSDs can be patched. Either interrupted or continuous sutures can be used to attach the atrial septal patch to the ventricular septum. In pediatric patients, the atrial septal remnant is elastic enough so that a gaping hole after resection of the septum can be closed directly. Autologous pericardium is also available for closing the gaping hole in the atrium. In this alternative technique, the size of the atrial septum around the fossa ovalis is an essential factor. An atrial septal patch of adequate size cannot be harvested in the case of a large persistent foramen ovale.

In summary, the atrial septal patch taken from around the fossa ovalis offers obvious advantages over conventional materials for VSD closure. This technique can be adapted in most cases of simple VSD with a small persistent foramen ovale.

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